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THE CANADIAN LANDSCAPE KEY

R. I. Simpson

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THE CANADIAN LANDSCAPE

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R. I. Simpson

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MAP READING

2. b) 1 : 633,600
1 : 15,840
1 : 100,000

- c) 1 inch represents 25,000 inches,
or $2\frac{1}{2}$ inches represents 1 mile (approx.).

1 inch represents 100,000 inches,
or 2 inches represents 3 miles (approx.).

2 inches represents 1 mile.

- d) 1 cm. represents 1,000,000 cms.,
or 1 cm. represents 10 Kilometres.

1 cm. represents 63,360 cms.,
or 1 cm. represents $\frac{1}{2}$ kilometre,
or 2 cms. represent 1 kilometre.

- e) 1 inch represents $\frac{1}{8}$ of a mile,
or 8 inches represents 1 mile.

3. a) i) 146 sq. miles
ii) 315 sq. miles (approx.)

- b) 3 sq. miles (approx.)

- c) 65 sq. miles (approx.)

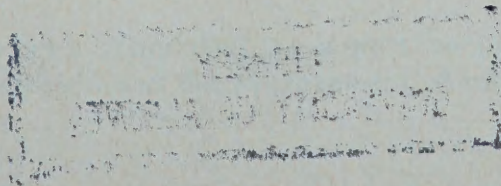
4. a) North-west

- b) North by north-north-east

- c) The angle of declination for the Peace River Map
in 1968 is $27^{\circ} 26'$.

The compass bearing would thus be 252° (approx.)

- d) 293 (approx.)



- | | | | |
|-------|--------|----|-------------|
| 5. a) | 448708 | e) | Hospital |
| b) | 372694 | f) | Gravel pit |
| c) | 352652 | g) | Quarry |
| d) | 376663 | h) | Power house |

6. 1575 feet
1700 feet
2250 feet

- | | | | |
|--------|--------|----|--------|
| 13. a) | 205085 | f) | 203106 |
| b) | 170060 | g) | 198115 |
| c) | 215105 | h) | 255085 |
| d) | 165070 | i) | 255072 |
| e) | 233013 | k) | 239121 |
| | l) | | 244074 |

Gradient: Height at dam	= 1300 feet
Height at Bécancour River	= 900 feet
Distance between dam and Bécancour River	= 4 miles

Therefore river drops 400 feet in 4 miles,
or 100 feet per mile.

This gives a gradient of 1 in 53 (approx.).

WOLFVILLE

1. $1\frac{1}{4}$ inches to 1 mile (approx.).
2. $13\frac{3}{4}$ miles N to S and $10\frac{3}{4}$ miles E to W.
3. (a) $\frac{3}{4}$ mile.
(b) Photograph 1 was taken at high tide and Photograph 2 at low tide.

On Photograph 2 the mud flats are exposed.

4. 25 feet; 100 feet.
5. Dip slope; scarp slope; undulating plain with streams.
6. The river has the meandering appearance of old age, but has not developed a wide flood plain. More particularly, it is an entrenched river.
7. (a) Coastal and river swamps; dyking along river (Upper Dyke village); aboideaux.
(b) An aboideau.
Holds back water at high tide; at low tide gates can be opened to drain the land.
8. The railway from Kentville to Wolfville has had to avoid the flat land close to the river and seek higher ground south of the dyke in order to avoid flooding. The railway has thus had to use both embankments and cuttings, and numerous bridges.
9. (a) Wolfville: located on a natural inlet near the mouth of the Cornwallis river affording an easy access to a navigable channel at high tide. Near the river at this point is gently sloping, well drained land away from flooding. It is the natural terminus of east-west routes along the river, and can utilise the high tides of the Bay of Fundy.

Port Williams: is at the lowest bridging point on the river, and routes from the north focus here. It was once the limit of navigation on the river.

Wolfville was abandoned as a port because of the increasing size of vessels and the improvement of other forms of transport.

- (b) In the past Canning was the head of navigation on Habitant Creek, and Kingsport gave easy access to deep water. Canning, which was once a shipbuilding town, is no longer connected to the creek because of reclamation of land for farming; Kingsport declined with the development of larger vessels and better inland transport.
10. No. Dams would be difficult to construct and there is no effective head of water. Also the creation of dams and reservoir lakes would flood valuable agricultural land for many miles.
11. On the map the east side of the inlet is shown as a swamp, whereas the photograph shows a dyke and farmland. The photo is more recent.
12. (a) An escarpment or cuesta.
The scarp slope faces south.
- (b) Gullies.
- (c) Mixed forest, particularly deciduous trees.
- (d) Orchards, grain growing and hay.

The orchards are not to be seen north of the escarpment.
- (e) More level land;
less bridging of gullies;
less danger of rock slides.

MONTREAL

1. (a) Map: 1496 sq. miles
Town Plan: $15\frac{3}{4}$ sq. miles.

(b) The photograph covers an area of approximately 9 square miles.

(c) The mountains were originally intrusions of very hard igneous rock. The softer overlying rocks were subsequently worn away, leaving Mont Royal and St. Bruno standing above the surface, having the appearance of extinct volcanoes.
2. (a) The docks appear on the map immediately north of Pte St-Charles. The docks extend downstream from the Victoria Bridge, as passage upstream is blocked by rapids. The site selected was close to Mont Royal for protection; also in this area the river current is directed to the west bank, thus scouring sediment from the dock area.

(b) Ile-Ste-Hélène
Pont Jacques Cartier.

(c) To permit passage of ships. A swing bridge or one that opened would impede traffic across the bridge.

(d) Canal locks are at the entrance to the Lachine Canal Basin. The canal route is to the southwest, and rejoins the St. Lawrence in the district of Lachine (see map). It appears in the northwest of Photograph 3 upstream from the rapids.

(e) Islands of riverine deposition, shallow water, rapids.

(f) Both the Rivière des Prairies and the Rivière des Mille Isles are shallow and blocked by many islands of riverine deposition; the Rivière des Milles Isles also has rapids.
3. (a) The railway lines terminate in the vicinity of the docks.

(b) South to Toronto; south to New York;
northeast to Quebec City; north along Ottawa Valley to Vancouver.

(c) Warehouses (grain elevators might be considered as a form of warehouse).

Montreal has always been a trans-shipment port because of the

Lachine Rapids.

4. (a) Looking north by northwest.

(b) Windsor Street.

(c) Mont Royal.

(d) Docks (with heavier industry downriver);
warehouses;

railways and railyards with poorer residential area along Lachine canal;

central business, commerce and light industry region;

residential and educational region;

parkland (Mont Royal).

(e) McGill University, located on the slopes of Mont Royal.

(f) Docks and industry are indicated in black.

Central Business area is in grey, as are rail lines.

Residential area is in pink.

Parkland is in white and green (contours are brown).

(g) Mont Royal is an obstacle to the construction of highways which are forced to circumvent the mountain. The railway has been forced to tunnel underneath the mountain.

5. (a) The land to the south and east consists of fertile and well drained sandstones, shales and glacial deposits, whereas the land to the north and west is badly drained clays that have created swamp and intermittent swamp conditions.

(b) i) Mixed farming with emphasis on dairying.

ii) Ile Jésus specialises in market gardening.

iii) North and west of the river dairying is most important, with specialisation on crops such as tobacco.

6. (a) The settlement is concentrated in a lineal arrangement between the main road and the river; there is no central nucleated village.
 - (b) This arrangement facilitated access to the river and direct access to the main road.
 - (c) The fields are long and narrow and are at right angles to the river and the road.
7. Montreal has excellent communications to overseas and inland areas. Abundant power is available from the Beauharnois Power Station (see map). The city's trans-shipment function led to the processing of products from its warehouses. It is in the centre of a rich agricultural area. The local market is large and Montreal is close to the abundant resources of the Canadian Shield.

LAKE LOUISE

1. 148 sq. miles
2. (a) $3\frac{3}{4}$ miles
- (b) Because the map does not take into account the difference in elevation between Yoho and Mount Stephen (5,700 ft.).
3. (a) The area consists of Palaeozoic sedimentaries. Fossil beds are indicated at grid reference 366989. On the photograph the light snow cover shows the layers of sediment. There is excessive sedimentary deposition along the river.
- (b) The sedimentaries are folded. Part of the anticline is visible on Photograph 1. The N.W. to S.E. alignment of the ridges indicates possible folding.
4. (a) Sherbrooke Lake;
Mount Ogden.
- (b) The sharp, knife-like ridge running south from Mount Ogden is

the main watershed. It is an arête.

5. (a) 457987
409975
491946
443004

- (b) i) Cirque (corrie)
ii) Matterhorn Peak
iii) Arête
iv) Truncated Spur
v) Finger Lake
vi) Hanging Valley
vii) Braided Stream

- (c) A - Cirque
B - Matterhorn Peak
C - Arête
D - Col
E - Hanging Valley
F - Finger Lake
G - Round-topped convex hill
H - U-shaped valley
J - Truncated spur

6. On north 7,100 ft.
On south 7,900 ft.

The ice level is higher on the south-facing slopes because these slopes face the sun.

7. (a) In this region the valley is a typical flat-bottomed, U-shaped valley with almost 3 miles between the 5,600 and 5,700 foot contours. Because of the flatness of the valley, it is badly drained.
- (b) Because they fill up with melt water in spring and dry up in late summer.
- (c) A U-shaped valley;
a braided stream.
8. (a) Coniferous forests, scrub, high grasslands, mountain or alpine vegetation, swamp (note the fire look-out tower).
- (b) Generally the tree line is to be found about 7,200 ft. on south-facing slopes and 6,500 ft. on north-facing slopes. However, the

tree line near Bungalow Camp is 4,300 ft. because the very steep slopes on the south side of Mount Field severely limit tree growth; another exception is Kicking Horse Pass, and for the same reason.

9. (a) 5339 feet
- (b) 1239 feet
- (c) Wood and coal burning locomotives required easy gradients.
399966
North-east
Between 250 and 300 feet
- (e) The railway line has to pass a spur of Mt. Stephen by means of another tunnel, and also avoid the flooding of the braided stream.
- (f) The introduction of high-powered diesels.
- (g) There is no flat land alongside the river.

The builders had to blast rock and level land for the railway;
bridge the river for the road;
provide protection against landslides and rock falls;
construct flat land (terrace) for road.

Hazards: rock falls through frost erosion;
landslides;
snow blockage.

10. From the south the boundary follows closely the highest elevations, e.g., peaks, spurs, and arêtes to grid line 980. North from here it follows the watershed between two streams to Stephen, thereafter it follows the spur of Mount Bosworth.

11. (a) High elevations;
glaciers;
steep slopes;
transportation problems;
absence of significant population centres.
- (b) Convenient route through the mountains (train is carrying coal);
tourism;
forestry;
Yoho National Park;
camping trails (near Sherbrooke Lake).

ORILLIA

1. (a) 1 inch represents 2 miles (approx.).
(b) 24 miles
2. (a) A line running east from Burnside to Buck Lake, then round the north of Sparrow Lake to Severn Bridge and east along the Muskoka District Boundary.
(b) The Shield.
The Great Lakes Lowland or Lake Simcoe Lowlands.
(c) The two parallel 750 ft. contour lines indicate a channel between the two lakes. Grass Lake is a remnant of this link.
3. (a) In the southern part of the map the drainage is northward and is more clearly defined. In the north there is a preponderance of swamp and lake. The drainage of the northern area is the typical confused drainage of a glaciated Shield area.
(b) A region of thin soil and impermeable, igneous or metamorphic rock.
(c) Part of the northern part of Sparrow Lake, McLean Bay, Moore Lake, Muldrew Lake.
Approx. 14 sq. miles.
The road bends south to avoid an outcrop of rock.
4. (a) Severn River.
Junction of Trent and Severn Rivers.
It is less than one quarter of the area of Photograph 1.
(b) By locks, which are to be seen south of the junction of the rivers.
The river is used for the generation of hydro-electric power.
(c) Locks
Marina
Railway
Cottages
Agriculture
Hydro installations
5. (a) The path of the ice.

5. (b) The long, narrow, N.W. - S.E. lakes formed by ice gouging indicate the path of the ice.
 - (c) This indicates Continental rather than Alpine glaciation, i.e. the area was completely under ice and the hills rounded off.
 6. (a)
 - i) Raised beaches rising to 850 feet are to be seen west of Lake Couchiching (indicated by wooded area on Photograph 1).
 - ii) Chief's Island is emerging from the lake and there are extensive sandy beaches (see photograph).
 - iii) Mud Lake and Lake St. John are remnants of the former lake.
 - (b) The St. John Creek north-east of Lake Couchiching shows areas of swamp indicative of an impermeable clay soil.
- West of the lake a sand pit is indicated near Uhthoff, and there are intermittent streams indicative of greater soil porosity. There are more extensive sandy beaches on the west of the lake.
- (c) Gully erosion.
 Woods Bay, Cunningham Bay, Quarry Bay.
 Summer cottages, agriculture, woods, highways.
7. (a) A drumlin.
 - (b) Sands and gravels.
 - (c) A till moraine or end moraine.
8. (a)
 - i) Glacial drift - till plain.
 - ii) Drumlin.
 - (b) Unsorted material with many stones.
 - (c) On the drumlin the land use is grazing, occasionally grains with some scrub forest; on the till plain arable farming or fallow land. The differences are accounted for by differences in soil conditions and aspect.
9. (a) On the Shield the roads, where they exist, are winding except near Sparrow Lake. South of the Shield is a rectangular road

pattern.

- (b) Although there is no significant difference in elevation between the two regions, the rugged topography of the Shield and the hard nature of the rock has prevented the development of a rectangular road pattern. Such a pattern was considerably easier to construct on the softer, more easily worked terrain to the south. Also the system of land grants encouraged a rectangular road pattern in the south.

- 10. In the north the population is concentrated along the main road and is centred on Gravenhurst. Poor soils, bare exposed rock, and swamp conditions account for this.

To the south, apart from the focal point at Orillia, the population is evenly distributed with a slightly greater concentration on the sandy region west of Lake Couchiching and alongside the lake where the population is often temporary. This is due to better soils, agriculture and tourism.

MOUNT REVELSTOKE

- 1. (b) By river erosion.
 - (c) The valley is V-shaped and, as such, is not typical of Alpine glaciation.
- 2. (a) The river falls 3,900 feet in about 7 miles or 550 feet per mile.
 - (b) The river is in the youthful or torrent stage. It is fast flowing and fairly straight. The main erosive force is downward, not outward.
 - (c) Dendritic.
 - (d) Elm Creek and Maunder Creek are subsequent. The tributary of Clabon Creek coming from the south is an obsequent stream.
- 3. (a) North of Elm Creek the watershed follows the high ground to the summit of Mount La Forme, then runs south along the arête at 7,500 ft., then east along the ridge to the 6,500 ft. contour line, then N.E. to the confluence of the two creeks.
 - (b) The streams are primarily fed by melt water and mostly dry up in summer. The region is deficient in rainfall.
- 4. Tarns: N. Central region.
Cirques: N. Central region.
Arêtes: S. West region.
Ice field: N. East region.
Matterhorn Peak: S. East region.
- 5. Trails lead to the abandoned mines. (The south-west part of the map is part of Mount Revelstoke National Park.)

LUNENBURG

1. 8 - 9 miles.
South-east.
3. 300 feet.
4. (a) North-west to South-east.
(b) The glaciers moved in a south-east direction imparting a N.W.-S.E. grain to the country.
(c) Undulating.
5. Moraine dammed lakes.
Moraines.
Drumlins.
Interrupted drainage.
6. (a) A cliff and a sand spit.

Coastal erosion and deposition. The high cliffs would seem to indicate a very hard bed rock resistant to wave erosion.
(b) Baymouth Bar: 976128
Sandspit: Goat Island, 958216
(c) Rugged coastal plain.
Drowned river valley (Mahone Bay).
Drowned nature of coast (off-shore islands).
7. (a) 80 - 90 %.
Saw mills are indicated on the map.
(b) The unusually large number of barns on the map might indicate dairy farming.
(c) i) Along coastal roads.
ii) Along roads leading to the interior.

The coastal settlements combine fishing and dairy farming.
The interior roads cross better drained land suitable for mixed farming and dairying.

8. (a) The map shows a large number of wharves (12) and the railway line terminates in the dockside area.
- (b) Sheltered harbour.
Good access to the sea.
Siltling is limited.
Well drained land (drumlins).
South facing aspect.
- Mahone Bay is subject to silting and is generally lower and has less well drained land. Railway facilities are not as good.
- (c) The vessels shown in the harbour in Photograph 1 are masted ships comparable in size to many of the houses, i.e., 30 - 40 feet in length. They are thus probably fishing schooners. Several of the ships in Photograph 2 appear to be much larger and are probably cargo ships.
9. Roads and railways follow the general grain of the land, the railway, in particular, avoids high land and skirts the drumlins. The major pattern is from the N.W. - S.E.
10. (a) About $8\frac{1}{4}$ square miles.
- (b) Oblique: Lunenburg Harbour
Eel Pond
Lunenburg Bay
- Vertical: Lunenburg Harbour
Back Harbour
Martin Cove
- (c) The agriculture is concentrated in the coastal area and on the lower ground. There are more farms located on the south facing area than the north.
- (d) East of Highway 3 there are about 36 dwellings (the large black rectangles are barns). This gives an approximate population of 180 people. The area is about 3 square miles, giving a population density of about 60 persons to the square mile.

NOOTKA-NANAIMO

1. (a) Sea level to 7219 feet.
2. (a) A nautical mile is 6080 feet.
(b) Approx. 65 miles (statute) or 54 miles (nautical).
(c) i) 44 miles
ii) 16 miles
iii) 1 mile wide
3. (a) Folded
(b) i) A dissected dome.
ii) Radial drainage .
iii) An intrusive batholith.
4. (a) The north coast is regular with a marked coastal plain. In many places the coast appears to be shallow with foreshore flats. The south coast is irregular and heavily indented, even fiorded. From the shoreline the land rises steeply to quite high elevations. There are many off shore islands, e.g. Gibraltar and Turret Islands. The coastal plain is limited.
(b) The north coast is emergent; the south coast is submergent.
(c) Finger lakes,
fiord coastline,
rounded hills.
(d) It is situated on the alluvial flat at the head of a fiord. The sides of the fiord are so steep that a town could not be sited along the fiord. Because of the length of the fiord Port Alberni is closer to the east coast than the west, yet the deep water of the fiord gives access to the Pacific.
5. (a) 49° N latitude.

Warm moist, west to south westerly air masses approach the coast from the west.

- (b) The precipitation is heaviest in the west with Henderson Lake recording Canada's highest precipitation of 250 inches. The east coast lies in a partial rain shadow with a precipitation of about 30 inches. Temperatures generally are above average for the latitude, especially in the valleys.
 - (c) The east because of the lack of rain.
 - (d) The natural vegetation is dense forest except in very dry areas. The combination of heat and moisture produces a rapid rate of growth.
 - (e) North and east of this line agriculture dominates because of flat land, mild temperatures and adequate precipitation. To the south and west dense forests cover the landscape, giving rise to an important timber industry. The intensity of agriculture is exemplified by the dense road network and the more scattered settlements on the coastal plain bordering the Strait of Georgia.
6. The road crosses the alluvial flat, then runs alongside Sproat Lake and the Taylor River valley. It then crosses a low divide to the Kennedy River and uses this river valley to descend to Kennedy Lake. From there it follows the level land of the coastal plain to Long Beach.
7. (a) Flat land,
deep water,
good communications.

Because of the steep sides of the fiord and the difficulty of building roads.

The Somass River appears to be bringing down silt which gives very shallow water on the north side of the inlet.

As its name suggests, Port Alberni requires deep water for its port facilities.

- (b) The area generally is unfavourable to settlement except in the Port Alberni area.
- (c) Timber and its products would be one main occupation; distribution of goods would be the other.

The central position of Port Alberni and its good communications to the rest of the region as well as to the sea give rise to these occupations.

LORETTA CANYON

1. 50 feet.
2. (i) Canyon.
(ii) Plateau surface, steep valley, flood plain, scarp slope, plateau.
3. (a) An escarpment.

The softer Cretaceous rocks to the north and east were more easily eroded.

The escarpment runs north-west to south-east on the photograph.

- (b) The alternating high and low elevations found in a west to east direction across the map.
4. (a) West to east. Examine the contour lines.
(b) The rivers have cut deep canyons through the soft sediment. 1250 feet deep.
(c) Alluvial fans. The sudden slowing of the river flow causes immediate deposition of vast quantities of alluvial material creating alluvial fans.
(d) A braided stream. The enormous amounts of sediment deposited on the bed of the river, coupled with variations in flow due to melt waters, causes the river to divide up into many channels.
(e) The impetus of the tributaries of the Imperial River has carried the main river to the north of the valley where the soft Cretaceous rock has been easily eroded into a high bluff. 250 feet high.
5. (a) Dry valleys are to be seen on the west central side of the map. Lessening precipitation since the last ice age has caused some rivers to dry up and others to appear as intermittent. Some rivers only flow during time of melt water from winter snows.
(b) It seems certain that at one time the upper waters of the Imperial flowed to the west but have been reversed by river capture. Attention is drawn to the path followed by the 1250 and the 1000 foot contour lines.

6. (a) To the north and east.

In this area there is a greater depth of soil on softer rock and the elevation is lower.

(b) South of Loretta Canyon some tree growth is evident up to an altitude of about 3250 feet.

(c) A remote area.

The river is flowing away from the market.

The river is also unsuitable for floating logs.

PEACE RIVER

1. (b) Dissected plateau.

2. (a) 777 feet.

(b) A canyon-like valley. The material is soft and easily eroded.

(c) After leaving the mountains the rivers are very slow flowing and deposit material.

(d) These rivers could be easily dammed for hydro-electricity (the Peace River Project is upstream). Because of the depth of these valleys, dams would hold back a very large reservoir of water in an artificial lake.

3. (a) The Peace and Smoky rivers are large, slow flowing mature rivers, whereas the others are youthful rivers and mainly of an intermittent nature.

(b) The Peace and Smoky are fed by rain and melting snows in the western mountains whereas the tributary streams come from a rain shadow area with limited snow cover to provide spring melt water.

(c) The climate is dry.

- (d) Despite the low rainfall because of low evaporation, sufficient moisture is retained in the soil to permit forest growth.

4. (a) Dendritic drainage.

Extensive gullying has taken place creating a type of badland topography. Low rainfall, very steep slopes, and soil removed by gullying has created a scrub vegetation.

- (b) 500 ft.

5. (a) The Shaftesbury Settlement occupies the south facing slopes and is on more gently sloping land than is found on the south bank.

- (b) About $\frac{1}{2}$ mile square, i.e., $\frac{1}{4}$ of a lot or 160 acres.

The feature lettered A is the 1650 foot hill 1 mile southeast of the golf course.

Lot 39.

- (c) The standard $\frac{1}{4}$ lot or 160 acres proved too small to be an economic unit, and some lots have been combined into larger, more economic units. A study of Photograph 2 shows that Lot 27 is a sparsely wooded outcrop. The map shows Lot 27 to be on much steeper ground than Lot 25. Also Lot 25 benefits from a much wider river terrace and greater alluvial deposition.

- (d) The houses are over 1 mile apart.

6. (a) Isolated farms are to be found on the plateau to the N.W. and S.E. of the rivers (Judah and Roma areas).

Lack of flat land near the major river made farm expansion difficult in the Shaftesbury Settlement.

On the plateau farms are laid out in a rectangular pattern similar to the Prairies. They are much larger than those in the Shaftesbury Settlement.

- (b) Both settlement patterns are similar in that they stretch inland from rivers and the houses are along the main road. The similarity ends there, however, because the size and arrangement of fields are totally different.

- (c) The isolated farms and large fields indicate extensive farming; probably grains, as is indicated by the grain elevators at Roma and Judah (see map and Photograph 2).
7. (a) The town of Peace River is situated on the right bank of the river where the river current scours the bank. (Note the deposition on the river bank opposite Peace River.) The town is located where a tributary stream enters the main river and is on quite extensive flat land - probably a river terrace. Bridging of the river was easier here than elsewhere.
- (b) Immediately to the east of Peace River is the steep wall of the river valley which makes communications to the east very difficult for road and rail.
 - (c) The railway has to descend some 750 feet in a short distance. The major problem is thus one of finding suitable gradients, which is achieved by numerous cuttings and by following the contours. Another problem is the bridging of many intermittent streams.
 - (d) On the plateau surface the roads follow the rectilinear pattern common to the Prairies, whereas because of the steep valley sides the roads descend to Peace River by a series of hairpin bends. In the Shaftesbury Settlement the road follows the river and links up the houses.

MEDICINE HAT

1. (a) From S. W. to N. E. the 2125 foot contour crosses the river in the north central region and Bench Mark 2184 is located on the bridge.
- (b) Facing south east.
350 to 500 feet high.
It is broken by Ross Creek.
Ross Creek is followed by the railway.
A flood plain.
- (c) The river is cutting through easily eroded glacial drift.
- (d) The maximum erosion of the river is carried on where the current is directed against the outside bend of the meander. Deposition takes place on the inside of the meander.

The light colour indicates areas of deposition.

2. (a) Vertical.

The loosely consolidated glacial drift has been easily eroded. The vegetation cover is sparse, thus exposing soil to erosion.

- (b) Arid.

- i) Intermittent lakes and rivers.

- ii) Lack of vegetation, especially trees, except in the river valley.

- iii) Erosion is predominantly vertical on tributary streams.

- (c) Gully erosion. Badland topography has developed as a result of infrequent heavy rains and lack of protective vegetation, assisted by wind erosion. Photographs 1 and 3 show this type of erosion very clearly. (Photograph 3 is shown on Photograph 1 where the river enters the left side of Photograph 1.)

3. Forest vegetation is to be found on the map on the inside of the meanders where water is plentiful.

4. Long hours of summer sunshine.
Exceptionally cold winters.
Lack of protective snow cover in winter.

5. (a) The dry, treeless prairie and short grass vegetation give rise to the brown soils that characterise the region.
- (b) Exhaustion of organic matter in the soil causes serious soil drifting.
Exposure of the soil to water erosion.
Possibility of failure of rains causing serious droughts.
- (c) Preservation of soils and vegetation cover.
Dry farming.
Extensive rather than intensive farming.
Grazing rather than cropping.
6. (b) It is the easiest route across the river for rail and road. Elsewhere very steep slopes on one bank or the other prevent easy crossing. Ross Creek provided easy access to the river terrace on which Medicine Hat is built. The higher ground reduces the risk of flooding.
- (c) The ridge south of Persons Creek prevents expansion to the south. The incised meander and possible flooding at the mouth of Ross Creek prevent eastward expansion.
Westward expansion is limited by very broken ground.
The high bluff limits northward expansion.
Expansion is possible on the plateau above the northern bluff.
It might be possible in the vicinity of the airport or the Stadium south of Ross Creek.
- (d) The map shows that Medicine Hat has expanded since the photograph was taken.
7. (a) Underlying sedimentaries in an anticlinal, synclinal formation.
Possible submergence under an ancient sea.
- (b) Transportation: the town was originally built where the C. P. reached the river.
Agriculture.
Gas wells.
Chemical plant.
Collection and distribution point.
Road and rail focus on Medicine Hat.
The chemical plant is located across the river north of Medicine Hat.
Such plants are usually located outside towns because of pollution of air and water.

- (c) Golf courses.
Camp grounds.
Race track.
Stadium.
Drive-in theatre.
Rifle range.
River.
- (d) On the air photograph the bridge nearer the camera is the road bridge.

FORT RESOLUTION

1. 1280 square miles (approx.).
2. Old age.
Flood plain, ox bow, meanders, meander scars, deposition, yazoo streams, confused drainage, low relief, distributaries, delta.
Meander scars do not show up on the map.
3. (a) The Slave is a river of old age, whereas the Battle is a river of pseudo old age. The Battle is a misfit river which gives the appearance of old age by meandering across almost horizontal beds of sedimentary rock. The Slave has built up a large delta and shows all the signs of old age.
- (b) Because the Rat River appears to flow from the Slave River to the Taltson River the land surface must be extremely flat, causing indeterminate drainage.
4. (a) A delta.
An arcuate delta: deposition, changing water courses, distributaries, delta lakes.
- (b) The deposition of material on the bed of the river causes constant changing of the course.
Used for navigation, e.g., "Old Steamboat Channel."
A transportation routeway: floating logs.

5. The coast north of the Slave River is an area of more intensive deposition and the best channel lies on the south of the delta. Fort Resolution is protected from deposition, to some extent, by a small peninsula.
6. East of Taltson Bay the coastline is more regular than to the west, because east of Taltson Bay there is a rock shore coastline which is part of the Canadian Shield. To the west is a more modified coastline of emergence (c.f. Lunenburg).
7. (a) About 2 miles to the east of the Taltson River.
East the land is higher, more rugged, with hard rocky outcrops and many small glacial lakes, and no significant vegetation, typical of Shield topography. To the west it is a low-lying deltaic landscape with swamp and forest vegetation. Water is much more abundant.

(b) The Oracha Falls are caused by an outcrop of the Shield.
8. Sawmills and logging;
trapping and fishing;
airport;
docks;
water transportation.
9. (a) Upriver.

(b) Number 2, because it is an oblique photograph.

(c) Ring Lake.

(d) The forest vegetation shows up on the photograph much darker than the swamp.

ROSYTH

1. (a) About $2\frac{1}{2}$ inches to 1 mile.
567 square miles.
2. (a) Plateau, river,
steep slope, steep slope,
flood plain, dissected plateau.
(b) South-west to north-east. Examine contours.
(c) The river drops 10 feet in 2 miles, i.e. a gradient of 5 feet per mile.
3. (a) Extreme dryness (intermittent streams).
(b) Aridity because vegetation is sparse except on valley floor.
(c) These lakes are intermittent and vary in size because of the aridity.
(d) Gullying and badland topography indicate aridity with periodic heavy rainfall.
4. (a) The river has all the appearance of old age, namely: meanders, ox-bows, ox-bow scars, yazoo streams, wide valley, and is slow flowing, but a wide flood plain is absent. In fact the river is a mis-fit river flowing in a wide flat-bottomed former glacial spillway.
(b) A combination of aridity, soft, easily eroded rock, gully erosion by tributaries, and wind erosion has produced badland topography. The flat land on either side of the main river represents the old glacial spillway valley floor. A slight rise of the land has created conditions resembling rejuvenation and the river and its tributaries have cut down through the old valley floor producing terraces.
Gully erosion can be prevented by restoring the vegetation cover and by river control.
(c) A yazoo stream.
5. Photograph 1 shows at least 6 ox-bow lakes.
Future ox-bow lakes will be created whenever the river cuts through the neck of the meander.

6. Ox-bow lakes are temporary, and fill up in times of flood. At other times they are cut off from a supply of water and dry up.
7. A lake.
Temporary.
It fills up with melt water or in time of rain, and dries up in the dry season.
8. (a) Both regions are plateaus of similar elevation.
Similar vegetation.
Depressions occupied by temporary lakes.
Extensive gullying.

(b) The soil on the plateaus is glacial drift, whereas the soil of the valley is alluvial.
9. (a) Flooding on the plain.
Gullying.
Aridity.
Bad drainage both on the flood plain and plateaus.
Poor soils on the plateaus.
Marshes.

(b) Agriculture;
camp;
gravel pit;
dam.
10. (a) Settlement is sparse throughout the area but is denser on the plateau than on the valley floor. Although the soils of the valley are potentially richer than those of the plateaus, much of the valley bottom is swampy and subject to flooding. Extensive farming is more easily carried out on the plateaus.

(b) The lack of population has restricted the density of communications. The flat-bottomed valley with its swamps has hindered the use of the valley for communications. The gullies are obviously a barrier to communications. Roads are more easily built on the plateaus than in the valley.

VERNON

1. (b) The lake is bordered by a series of terraces between 1120 and 1150 feet. These are used for agriculture.
- (c) The head of Okanagan Lake has been filled in by alluvial material brought down by the Creek, and the lake is gradually shrinking, leaving marshes and small lakes.
2. (a) A hanging valley. The deeply indented valley indicates easily eroded soft rock.
- (b) The valley is U-shaped.
Deep Creek shows many meanders near Lake Okanagan.
By a line of trees.
- (c) The creek in the extreme northwest (Irish Creek) and its tributary creek (a hanging valley).
3. (a) The irrigation ditches, the reservoirs, and the sparse vegetation are indications of aridity.
- (b) The air masses approach from the west and only the highest hills immediately west of Vernon receive sufficient moisture to permit tree growth. The rain shadow slopes are covered with scrub and grass.
4. (a) This ditch runs along the contours instead of crossing them. Therefore, it is running along the side of a hill instead of down the slope, which is clear evidence that it is man-made.
Between the road and the irrigation ditch agriculture is indicated on the photograph by a darker colouration.
- (b) Two small lakes high up in the hills fed by melt water.
Goose Lake has been dammed by man to ensure the water supply.
- (c) Created by damming.

The extreme aridity of the region makes it necessary to have an alternative supply of water. The natural supply of water to the irrigation ditch has been seriously depleted by the time the ditch reaches the vicinity of Swan Lake. It must be supplemented by water from Goose Lake which has been controlled by damming.

5. (a) By terracing.

- (b) The water supply is gravity fed, and terraces help to retain the moisture.
Soil erosion is controlled.
The terraces raise the frost-sensitive crops above the cold air draining to the bottom of the valley.
 - (c) On the lowest levels the crops have to be tolerant of a slight degree of frost, e.g., vegetables, hay and some dry wheat farming and apple orchards. Above are the more tender fruit orchards.
 - (d) Pastoral farming. Summer transhumance might be practised.
6. This is largely Indian Reserve.
7. A collection and distribution centre with processing of foodstuffs. A route centre for the surrounding region.
8. (a) Because of the north-south alignment of the mountains.
- (b) Most of the Canadian markets lie in the east or west, so this alignment increases Vernon's distance from its markets.
9. (a) An alpine glaciated valley.
- (b) A wide, flat-bottomed, steep sided, U-shaped valley; lateral moraines.
- (c) Fruit orchards on the lower slopes and in the foreground (protected by the lake). In the middle background, arable farming and orchards. The higher slopes are possibly used for pastoral farming and timber.

CRANE LAKE

1. (a) From 2325 near the N.W. lakes to 2575.
The region is lowest in the N.W. and highest to the east.
- (b) A seasonally submerged depression, indicated by depression contours (depression contours are indicated by hachures on the contour).
2. (a) It indicates that Crane Lake, although a permanent lake, shrinks considerably in the dry season.

The photograph can be located on the north shore of Crane Lake by the farm buildings and the promontory jutting out into the lake.

- (b) The lakes of the northwest are purely temporary, (as indicated by the colouring), being filled up by melt waters in the spring.

They are called Playa lakes.

The water is obviously receding from the original shore line of Crane Lake, exposing salt flats.

- (c) The water from these lakes disappears through evaporation and the lake beds become alkaline.

3. (a) A crescent-shaped sand dune.

In arid regions the prevailing wind blows the sand into this typical crescent-shape.

Barchanes indicate a lack of vegetation cover, a sandy-type soil probably derived from sandstones or shales.

- (b) Crescent shape.

The steepest side is to the west and south west, therefore the prevailing winds are west to southwesterly.

- (c) Most of the barchanes are fixed by vegetation, but some are bare sand and presumably in motion.

4. Temporary lakes;
absence of permanent rivers;
relative absence of forest vegetation;

only one farm is to be seen on the map, which would suggest highly extensive farming characteristic of arid areas.

5. Short grass vegetation with sparse scrub and stunted forest.
A brown soil zone.

6. (a) Cattle ranching.

Over-grazing could lead to Desert Bowl conditions.

- (b) These trails are probably for the rounding-up of cattle.

GRIMSBY

1. (a) The area shown on the map is approx. 40 square miles. About one tenth of the fruit belt is shown on the map.

- (b) As a line of forested land.

- (c) $4\frac{1}{2}$ square miles (approx.).

2. (a) From north to south: coastline; old lake bed (Lake Iroquois); raised beach; scarp slope; escarpment.

- (b) Sand.

The eastern part of the coast. Coastwise current.

- (c) Sandy beach,
regular coastline.
raised beach.

- (d) 080840

- (e) Clays, marls, shales, and sands are found along the foot of the escarpment.

- (f) Dolomite limestone.

The dip slope is covered by a thin layer of glacial drift.

3. (a) The dip slope of the Niagara escarpment is obscured by a mantle of glacial drift which tends to slope to the east because of slightly higher glacial deposits to the south, west and north.
- (b) It descends the scarp slope by means of a deeply incised valley and a waterfall. Forty Mile Creek enters a gorge at the junction of till and limestone. This gorge has been overdeepened by the melt waters of the ice age.
4. (a) Concentration of orchards,
denser network of roads,
greater number of farms.
- (b) Fruit farming and canneries.
- (c) Proximity to water will moderate temperatures and lengthen the growing season. The gentle slope below the escarpment will allow good air drainage and lessen the risk of frost.
- (d) On the top of the escarpment the climate is not so suitable for fruits, but land is more plentiful and cheaper and is more suited to extensive mixed farming. Some fruits are grown on the escarpment but these are mainly of the hardier types (apples).
- (e) A: scarp slope
B: greenhouses
C: Queen Elizabeth Way
D: Canadian National Railways
E: football field
5. (a) In an east - west direction because north to south communication is extremely difficult due to the escarpment. The major population centres are aligned east to west.
- (b) North of the escarpment.
- (c) Construction at the foot of the escarpment avoids the problem of crossing the escarpment. The old lake bed permitted easier construction.
- (d) Rail sidings, clover leaves, etc. The major problem for the farmer is the loss of valuable farming land.
- (e) It could have been routed along the top of the escarpment. By doing so valuable farming land would have been saved.

- (f) It follows the contours as far as possible to lessen the gradients.
Cuttings have had to be made to facilitate its descent.
- 6. (a) Clay lands at foot of Escarpment.
Escarpment and raised beach.
Glacial Drift area on top of escarpment.
- (b) Deciduous trees dominate.
- (c) Fruit trees,
woodlands,
recreation,
residential
- (d) Fruitland.
- (e) A: tanks
B: school
C: railway line cuttings
D: barn
E: woodlot
F: orchard
G: fallow field
- 7. Grimsby, Winona and Fruitland probably began as local farm servicing centres. They have now developed food processing industries. They are also possibly dormitory centres for Hamilton.

THETFORD

1. (a) Approx. 19 acres.
(b) Asbestos is named at a mine in the north-east.
(c) Open pit quarrying. Debris is deposited in enormous dumps.
2. (a) The Bécancour River shows signs of rejuvenation. Between Thetford Mines and Black Lake the river drops 150 feet in just over 3 miles. Such a gradient cannot indicate a river in old age, yet the river shows signs of meandering. This would suggest rejuvenation.
(b) An uplifted peneplain or dissected plateau.
(c) An exposed igneous intrusion.
(d) Asbestos is a metamorphic rock formed by recrystallisation of the intruded igneous material.
3. (a) There are many examples of dendritic drainage.
(b) The valleys are deep and steep-sided which facilitates dam construction.
(c) The dams and reservoirs are used for water supply to the towns and mines. The map indicates that the dams and reservoirs are not used for the generation of electricity. Because the catchment areas are limited electricity is brought into the area from Shawinigan Falls.
4. (a) Deciduous forest on lower land, swamps, mixed forest on higher ground.
(b) A saw mill is located at Black Lake.
(c) The main agricultural area would appear to be northwest of Thetford Mines along the roads to St-Damase-de-Thetford and Pontbriand. Large areas of the forest have been cleared in this area and there are indications of barns.
5. (a) Thetford Mines is built on sloping ground.
(b) The town is expanding to the north and east. Expansion south is

blocked by dumps of debris from the mining. The town has moved away from the dust from these dumps.

- (c) It is apparent from map and photographs that there is only one major industry in Thetford Mines.

When the community depends on only one major industry, that industry can control the economic life of the people and its decline can affect the entire economy of the area.

6. (a) 220058

- (b) A: Black Lake.
B: The road N.E. from near Murphy Hill towards Maple Leaf Mine.
C: The open pit mine at Murphy Hill.
D: The smoke indicates a plant probably for crushing the ore.
E: A dump for debris and overburden.
F: Slag from crushing - note crane.

QUETICO (ATIKOKAN)

1. (a) The river crosses the 1400 foot contour line just to the west of Bickford (in the N.E.), and Bench Mark 1260 is to be seen close to Banning in the southwest.
- (b) 140 feet.
Rapids, waterfalls and dams.
- (c) From 1220 feet in the south to 1600 feet in the north.
- (d) Continental glaciation.

The great ice sheet scraped off most of the soil and smoothed and rounded off the landscape. This resulted in very confused drainage.

2. (a) The large amount of water present is the result of an impermeable rock peneplain rather than excessive rainfall. The area shows confused, interrupted drainage as a result of impermeable rocks, peneplain surface, ice gouging and moraine damming.

The thin soil and impermeable nature of the bedrock results in large areas of muskeg and a surface water table.

- (b) The rocks are hard, resistant and impermeable - probably igneous and metamorphic.
- (c) Part of the Canadian Shield. This is indicated by the hard, resistant, impermeable rock and the poor drainage.

3. (a) Mining,
forestry,
airport,
railway,
camps,
town.

- (b) The name Hematite appears (iron ore).
- (c) The lake has been drained.
The lake is more completely drained than is shown on the map.
Exploitation of iron ore.
- (d) Dams had to be built at the entrance and exit of the lake. This

was the first step in draining the lake. The Seine River had to be diverted. Then the lake had to be pumped out to expose the mineral and its overburden; and the latter had to be removed. This meant access roads had to be built to the lake and, after draining, to the bottom of the lake.

- (e) Open pit mining.

The old level of the lake is indicated by the dark line on the steep cliff on Photograph 3.

- 4. (a) By truck and by a spur of the railway line.

By rail east to the Lakehead. Truck export via Highway 11 would be uneconomic.

- (b) The town appears larger than any other community in the area. The road network appears incomplete. There are dry weather roads leading to recent dams. The power networks concentrate on Atikokan. The street pattern, modern houses and airport indicate recent development.
- (c) The railway is the main link between the Prairies and the Lakehead for the export of wheat.
- (d) A: mine
B: crusher-concentrator
C: hydro lines
D: railway east to the Lakehead
E: railway siding
F: airport runway
G: drainage dam

- 5. (a) Airport
Seaplane base
Highway

- (b) Many portages exist.
- (c) Float planes utilise this region, particularly for tourists. In winter roads are made over the ice.
- (d) The lakes have not been fully surveyed as yet. Also the water level in the lakes does vary from year to year.

6. (a) The older part of Atikokan is in the foreground close to the rail-way because the rail link existed long before the mine was discovered.
 - (b) Atikokan could expand in any direction, but has expanded to the north to be closer to the mine.
 - (c)
 - i) Engine sheds;
round table;
water tower.
 - ii) Box cars;
ore carriers.
 - (d) Collapse of the industry would mean economic disaster to the town. The community is dominated by the company, which can control the economic life of the people.
7. Fire look out towers,
logging trails,
— northwest of Atikokan there are a number of unpaved, dry weather roads surrounding a forestry camp.
 8. Hunting,
fishing,
recreational use of lakes.

ARVIDA

1. (b) A glacial deepened, fiord-like trench.
2. (a) In the north central region (420725).

The Shield is covered by a thin, ill-drained mantle of glacial drift overlying hard, impervious rock.

- (b) Many streams are intermittent.

Precipitation in this area is 30 - 40 inches, which provides an adequate water supply for the rivers. However, in summer the Shield area becomes very dry due to an absence of melt water and the high degree of evaporation.

3. (a) 400 feet and 450 feet.

At this height the resistant rock outcrops above the glacial till.

This is a large outcrop of hard, resistant rock which has been rounded and smoothed by continental glaciation.

- (b) North of St-Jean-Vianney and along the southbank of the Saguenay.
Large deposits of sand and gravel occur in glacial till.
It is used widely in dam construction and factory building.

4. 250 feet.

Almost 3 miles.

Approx. 83 feet per mile: 1 in 64.

5. Forestry.

The Shield area limits agriculture as does the glacial drift. Both photographs and map show large areas of forest.

6. Pulp and paper.

Jonquière-Kénogami, because of abundant supply of pine, fir and spruce and other soft woods; rivers from the Shield for transport; plentiful water supply for factories; and abundant power.

7. (a) Aluminum.

- (b) Hydro-electricity.

They are to be found along the Shipshaw and Saguenay Rivers.
Abundant water supply;
large catchment area;
good foundations for dams;
valleys easily dammed;
steep slopes give a good 'head' of water;
excellent building materials nearby.

- (c) Penstocks are pipes leading water to the power house. They provide a 'head' of water.

- (d) The Shipshaw River has a larger catchment area.
Transmitted by power lines.

- (e) To create a reservoir to ensure a constant supply of water.

8. (a) Bauxite.

(b) By rail.

(c) It is built on fairly flat land at the mouth of the Chicoutimi River, whereas in the vicinity of Arvida port construction is difficult because of the steep sides of the valley.

(d) As the plant expanded the steep gradients of the railway line made it difficult to keep up a supply of ore.

The docks at Chicoutimi might not be big enough to handle ever-increasing traffic.

9. (a) Above the 300 foot contour line.

(b) Because it is the only large area of flat land in the district.

(c) No.

Because of the very steep slopes to the north and west.

To the south because, although it is near the 450 foot contour line, the land is gently sloping.

10. (a) Arvida and Kénogami-Jonquière.

Both centres are planned towns. Jonquière is planned on the rectangular pattern whilst the southern part of Arvida is laid out in crescents. Of the two, the crescent shape is the more modern in Canada.

(b) In the modern planned town great care is usually taken over the layout of streets, siting of schools, shopping plazas, churches, recreation, etc. However, in some planned towns the houses were all built of one standard pattern which becomes monotonous. Plazas were sometimes added as an afterthought, and high rise apartments built without adequate provision for schools.

(c) Facing north.

Church,
schools,
woodland,
railway (in background).

WINNIPEG

1. (a) The map.

(b) Map: 140 sq. miles.
Plan: 15 sq. miles.

(c) 50,000 inches or $\frac{3}{4}$ mile approx.

2. (a) The region is extremely flat, similar to a flood plain.

(b) 3 Bench Marks are shown on the map all about the same height,
(766.8: 765.4: 765 feet).

Advantages are that no cuttings for rail and road had to be built away from the city; few bridges had to be constructed for road and rail; railways run in straight lines.

The flatness of the land has greatly facilitated urban expansion and construction of lines of communication. The main disadvantage is that the area is subject to disastrous floods.

(c) It outlines an old ox-bow scar.
It is used for housing and a park.
Enfield Crescent follows the ox-bow scar.

3. (a) The flatness of the area is indicated by the absence of contours. The rivers are meandering and only some 10-20 feet below the level of the land.

The rivers flow from south to north. In spring the mouths of the rivers remain frozen whilst the ice on the rivers further south melts. This causes back-up of the water and flooding. Photograph 2 shows that the river has overflowed its banks at several points.

(b) Vicinity of Churchill Drive.

In order to cross 2 contour lines on the Town Plan the river must rise more than 20 feet.

The south side of Churchill Drive is embanked.

Flooding occurs near Government House on the Assiniboine; the rail yards on the west bank of the Red River; the inside of the

meander on the right bank of the Red River.

(c) Because of the flatness of the land flood control by dams is not feasible. One alternative is to allow the water to back up into old lake beds. The other, and major, method of flood control is to dig ditches (see east of river on the map) extending for many miles through open country. Then as the river rises these ditches are opened to allow back up of the excess water and so relieve pressure on the main rivers. Sometimes dynamiting of the river ice is carried out and a more modern method is to spray the ice with chemicals designed to melt it.

(d) Dam construction would only be feasible if the rivers flowed through fairly deep valleys.

4. (a) It was the meeting point of river transport on the Red and Assiniboine Rivers from north, south and west. Bridging here was easier because, if the crossing had been south of the confluence, two bridges would have been necessary.

(b) In grey.

Main and Portage. These can be seen in the centre background of Photograph 2.

(c) Portage Avenue was the beginning of the old overland route to Edmonton and the west. Main Street was an old settlers' routeway to Selkirk and Hudson's Bay, which was also used by fur traders.

5. (a) See atlas.

(b) For its size Winnipeg has a disproportionately large number of railway yards. 6 large yards are to be seen in Winnipeg as opposed to 4 in Montreal and 4 in Vancouver.

(c) Winnipeg is the chief transportation centre linking eastern and western Canada. It is a collection and distribution centre for eastern products going west and vice versa.

(d) The letter E for elevator is an indication of large grain shipments passing through Winnipeg. Also Winnipeg has large stockyards.

6. (a) Winnipeg is dominated by a central core of business and commerce with a zone of old housing close by. Then there is an outer ring of railways and industries, and finally a zone of new suburban

development. Montreal is an example of altitudinal zonation in its older parts.

- (b) Oil refinery.
Elevators.
Gas.
Stockyards.
Railway yards and shops.
- (c) The layout of the streets in crescents suggests modern development, as does the open spaces and modern shopping centres; less industry is to be seen east of Gateway Road.
- (d) Government House.
Hospitals.
Golf courses.
Race track.
Skeet club.
Armoury.

7. (a) An area of French settlement.

- (b) The pattern is largely rectangular, although the north to south and east to west alignment is seldom adhered to. In many places the streets are at right angles to the river, and since the river meanders there is confusion in the street pattern.
- (c) The flat land has facilitated building in regular blocks.
- (d) Facilitates road construction, servicing (public utilities, etc.), traffic problems and zoning.

VANCOUVER

1. 1½ miles.
2. Map.
Photograph.
3. North of Burrard Inlet is an Alpine glaciated area showing finger lakes, fiords, swift streams, hanging valleys, U-shaped valleys, arêtes, cirques, and Matterhorn peaks.
4. North of Burrard Inlet is the glaciated area described in Question 3. South of Burrard Inlet and the Fraser is a low lying, deltaic area showing delta, deltaic islands, swamps, foreshore flats, meandering streams and distributaries.
5. The north to south alignment of the mountains with intervening, deep canyon-like valleys suggests folding.
6. Abundant water (lakes and river);
mountains are deeply etched by rivers subsequent to glaciation;
dense forest vegetation;
heavy cloud cover (Photograph 2);
snow (Photograph 1).
7. Swamp; grassland; deciduous, mixed, and coniferous forest; and alpine vegetation.
8. (a) The southern region on the predominantly deltaic area.
(b) Photograph 3 shows the delta near Ladner.

Deep, fine grained, easily worked soil.

- (c) Dairying, market gardening, mixed farming, soft fruit.

The existence of a large urban centre nearby requires large quantities of these products. Vancouver is remote from other sources of dairy produce and market vegetables. There is little other flat land in the area.

- (d) Barber Island.

The map shows peat bogs and swamps. The southern part of the islands is very badly drained, and is not laid out in fields.

9. (a) Sheltered harbour.
Extremely deep, fiord-like harbour.
Ice-free region.
Close to the mouth of the Fraser Valley and the route through the mountains.
Close to the U. S. A. frontier.
- (b) The major docks are on Burrard Inlet. False Creek is too small, is shallower than Burrard Inlet and has a very narrow entrance. The mouth of the Fraser is very shallow, rendering navigation difficult, and the surrounding land area is too swampy for industrial and commercial development.
10. (a) North-east.
False Creek.
- (b) Low cost housing.
Mills.
Lumber yard.
Timber raft.
Railway yards.
Small factories.
Commercial development.
- (c) On Photograph 1, False Creek appears in the foreground; the Georgia Street Viaduct appears just south of the centre of the photograph.
- (d) Railway yards.
Central Business District.
Rail yards.
Warehouses.
Docks.
- (e) Photograph 5 shows Coal Harbour in the right background, and an area as far east as Grid line 93.
- From foreground to background:
Tugs,
coastal steamer,
cargo vessels.
- (f) Lumber,
grain,
meat packing (not very clear in the photograph).

11. (a) The sketch map should show the following.

Docks, warehouses, oil storage tanks;
railways;
Central Business District with residential area to the east and west;
timber industry and factories;
railways;
False Creek;
R. C. A. F. supply depot;
timber yards;
small factories;
residential.

(b)	Dry dock.	Rail yards and shops.
	Grain elevators.	Lumber industry.
	Coal depot.	Business Offices.
	Oil tanks.	Retail stores.
	Oil refining.	Insurance and banking.
	Gasoline tanks.	Hotels.
	Petro-chemical industry.	Fishing and fish canning.

(c) The bulk of the industry is concentrated round False Creek where there is plenty of low land available. The area is well served by 3 railway lines (C.N., C.P. and Gt. Northern).

(d)	A: log boom.	H: elevators.
	B: mud flats.	J: Marina.
	C: Georgia Street Viaduct.	K: Brockton Point Light.
	D: railway yards.	L: recreation.
	E: oil tanks.	M: docks.
	F: stadium in False Creek Park.	N: Central Business District.
	G: warehouse.	O: residential.
		P: industrial

12. (a) Road, rail, air and sea.
Vancouver is a trans-shipment centre.

(b) On Sea Island.

Flat land for airport construction. Aircraft can avoid flying over Greater Vancouver. The airport is situated quite some distance from the mountains.

(c) Both the major railways use the Fraser Valley. The C. N. runs

south of the river to False Creek, whilst the C. P. runs to the north to Burrard Inlet. However, both railways have termini on False Creek.

13. (a) Two.
Stanley Park to West Vancouver.
Suspension.
To enable ships to pass underneath.
- (b) They enabled the city to expand northward. The bridge at the First Narrows led to the growth of West Vancouver, and the Second Narrows Bridge led to the growth of North Vancouver.
- (c) Because this area is closer to central Vancouver and avoids the use of valuable agricultural land to the south. It also avoids the extremely swampy areas to the south.
- (d) The expansion is limited by the mountains to the north, swamps and low lying ground to the south.

Because there are only two bridges linking the north shore of Burrard Inlet to Vancouver, there is extreme traffic congestion at peak periods.

14. Capilano; Coquitlam, Alouette and Seymour lakes.

15. Both cities:
are trans-shipment ports,
are main railway centres,
are commercial and industrial centres,
have connecting rail links to the U. S.,
in both expansion south is undesirable,
are zoned on terraces,
have excellent deepwater ports,
rely heavily on bridges for expansion.

TORONTO

1. (a) From 246 feet at Lake Ontario to 1550 feet in the northwest.
(b) In the north and west.
(c) The Humber and Don Rivers.

2. (a) Cliffs.
304 feet high. (The lake is 246 feet and the 550 foot contour line meets the coast.)

The surface material is very soft (glacial till), which is easily eroded by streams. The cliffs are also being eroded by wave action.

- (b) South and west of Birch Cliff the coastline is emerging.

The hook-shaped islands indicated on map and photographs are low-lying and sandy, and are emerging from the lake.

The harbour is subject to silting and requires constant dredging. The town plan shows that the land rises gently to an old shore line in the Woodlawn Avenue area.

3. (a) A is Riverdale Park.
B is immediately south of Pottery Road.

These are alluvial flats with very deeply cut meanders. In the past, the Don River had considerably more water in it than now and was not contained in a channel as now. Therefore it cut deep meanders in the soft, easily eroded material of the old lake bed.

- (b) C, D and E are deeply cut ravines which were once tributary spillways of the Don River.

The very steep sides indicate erosion of a very soft material.

- (c) The Don River appears to be a glacial spillway and the present Don River appears as a misfit stream. The water level of the Don is now low due to flood control and the industrial use of the water.

- (d) The lower part of the Don River has been canalised. This was done to prevent flooding; to increase the flow of the river so as to scour its bed; to protect the railway and industries occupying the

alluvial flats and to provide deeper water for small boats using the lower reaches of the river.

4. (a) A recurved sand spit.

The material of which this spit is built comes from the high bluffs to the east. These bluffs are eroded by storm waves driven by very strong east winds.

- (b) The hook shape indicates that the prevailing winds are from the west. These west winds cause the wave action to curve the sand spit into its characteristic hook shape.
- (c) The existence of this sandy hook provided a shallow but well protected harbour.
- (d) The advantages are that there is abundant flat land and dock construction in the soft material was easy. The level of the land is barely above that of the lake, but this is not necessarily a disadvantage in the absence of tides.

The major problems are in obtaining solid foundations for large buildings, in the constant dredging necessary and in the high water table.

Both Paris and London are riverine ports as opposed to lake ports. London has a substantial tidal range necessitating the construction of wharves. All three are built on soft alluvial or silt deposits.

5. (a) These rivers provided access routes to the interior but were often subject to serious flooding, particularly in spring. The valleys are often very steep sided, almost ravine-like and this, coupled with the flooding, tended to make people avoid the valleys. With the development of water power for saw mills and grist mills, however, small communities sprang up along the valleys. Because of the existence of the tributary ravines and the difficulty of bridging them the city tended to expand on the interfluves. Letters A and B indicate the interfluves on Don River.

Reference to the map and photographs shows that in many cases the railways tended to avoid the valleys rather than follow them. This was due to flooding and the steepness of the valley sides and, in the ravines, the absence of flat land at the bottom of the valley. The more modern expressways, however, do use the valleys because the rivers, e.g., The Don, have now been canalised and controlled.

6. (a) The letter F indicates the Canadian Pacific Railway line which is to be seen on the Town Plan in the Rosedale area (grid reference 293377), and crosses the map from west to east near the 450 and 500 foot contour lines. This physical feature appears as a bluff or cliff some 40 - 70 feet in height. This feature appears in the background of Photograph 6 as a dark line (trees).
- (b) This bluff or cliff represents the old shore line of Lake Iroquois. In the early history of Toronto this old shore line limited the northward expansion of the city.

7. From N. W. to S. E. :

a small part of the Niagara Escarpment, the scarp slope, the till plain, and the old shore line.

8. (a) The name Limehouse suggests limestone.
- (b) In the north the lakes are more numerous. The northern hills do not show a clear scarp slope. The topography to the north is more undulating than that of the west. The north is lower than the west.
- (c) The two highland areas merge north-west of the town of Bolton.
9. (a) From about 1000 feet to near 500 feet.

The land drops some 500 feet in 21 miles or about 24 feet per mile.

Using the fraction vertical interval over horizontal equivalent, this gives a gradient of 1 in 222.

- (b) Dendritic drainage.
- (c) The Humber originates in both the morainic hills of the north and the escarpment to the west.
- (d) The Humber River exhibits an unusually large number of meanders throughout its middle and lower course. In places the river valley is very wide for so small a river. In fact the valley has many of the characteristics of a glacial spillway with the present Humber River as a misfit stream which, in time of heavy rain or spring melt water, floods the valley floor.

The railway avoids the danger of these floods.

- (e) Bolton.

The older part of Bolton lies north of the new subdivision.
Letter F on Photograph 7 lies between the two parts of Bolton.

A study of the contours on the map shows that 'Old Bolton' lies at the foot of a very steep valley, whereas 'New Bolton' lies on flatter land above the valley.

The older part of Bolton lies directly in the path of river flooding.

- (f) A: kettle lakes in moraine.
B: orchard.
C: pasture land.
D: land ploughed for grain.
E: wood lot.
F: agricultural fair ground.
G: gully erosion.

- (g) Less than 10%.

10. (a) Gully erosion.

Periods of dry weather are followed by heavy rain. This, allied to a very high degree of run-off, causes the gullying.

- (b) The northeast area of Photograph 7 shows extensive gullying. Rivers are liable to rise very quickly in time of flood.
- (c) Communities downstream can be subjected to very sudden disastrous floods; valuable flat land alongside rivers must be abandoned; very expensive flood control works must be built.

Agriculture is eliminated from large areas of good farming land.

- (d) Control dams to regulate river flow can be built; river banks can be straightened and strengthened; over-flow channels can be built.

On a long term basis the water-sheds should be re-forested and better agricultural practices introduced, i.e. permanent vegetation should be restored to some ploughed areas.

11. (a) 9.

- (b) The coastline has imposed a N.E.-S.W. alignment on the routes.

With the highest land to the north and west, railways in that area

have used river valleys except where flooding is prevalent.

The railways use river gaps in the hills.

On the till plain the relief is not so prominent and the railways have not been so influenced by physical features.

The escarpment at Credit Forks has been deeply cut by river action and the resultant gap used by a railway.

(c) They terminate close to Toronto harbour.

Other facilities are sea, road and air (Toronto island airport is shown on the map).

12. (a) The 250 foot contour line, and the Bench Mark in the dock area shows the docks to be only some 3 feet above the level of the lake. (The lake level does not fluctuate greatly.)

The land is very low lying and swampy with a high water table.

Large-scale reclamation work was necessary, with extensive filling and building of retaining walls.

- (b)
- C: general dock area.
 - D: oil storage tanks.
 - E: gas tanks (refer to Photograph 2).
 - F: ship channel.
 - G: lift bridge (refer to Photograph 2).
 - H: residential.
 - J: ferry boat terminal.
 - K: warehouses.
 - L: railway round house.
 - M: grain elevators.

- (c)
- Loading and unloading ships.
 - Warehouses.
 - Grain elevators.
 - Oil tanks.
 - Railway and expressway (trucks).
 - Sugar refinery in foreground.
 - Light industry.

- (d)
- It was the early site of the city;
 - sheltered harbour;

river could be canalised in this area;
flat land available for factory construction;
area well served by transport facilities.

The transport facilities are being improved by the building of expressways (Gardiner Expressway and Don Valley Parkway).

Gardiner Expressway.

The expressway is elevated on concrete pillars, to go over existing land uses.

Photograph 9 is the more recent because on it the expressway is shown as completed, whereas Photograph 5 shows it under construction.

- (e) The waters of the Don River have become seriously polluted with industrial waste, creating a hazard to health. The background of Photograph 2 shows that in addition to water pollution, Toronto has also a considerable air pollution problem.
13. (a) Immediately north of the Union Station the land use changes to business and commerce.
- (b) Bay Street.
 - (c) On Photograph 4 the shadows indicate that the buildings are high. The height of these buildings can be seen more clearly on Photograph 6.

Banking and finance (Montreal Trust).

City administration.

Small businesses (television appliances).

Hotels (Royal York).

- (d) Looking east.
The old City Hall.
- (e) East of the Central Business District, the land use changes to very old residential buildings and to factories.
- (f) University Avenue.
University.
Hospital.
Public Buildings.

Industry - retail and warehousing.

14. Docks, dock facilities, oil storage;
warehouses;
railways;
Central Business District;
small factories;
retail and shopping centre;
residential;
institutional and government, with residential.

LONDON

1. Several rivers flow southward from the hills to the north, and there are many rivers flowing northward from the southern hills.

The Northdowns are about 800 feet high.

The photograph shows that the land rises steadily from the buildings in the foreground to the rim of hills in the background.

2. (a) There is a complete absence of surface drainage throughout part of the Northdowns, yet rivers abound elsewhere.

Because of the porosity of the rock and the absence of surface water, vegetation is poor, e.g., grass for sheep and scrub woodlands.

- (b) The 200 foot contour line marks the approximate junction of porous and nonporous rock, which is evidenced by the fact that streams appear north of this contour line (a spring-line).
 - (c) Both rivers have cut down through the porous rock (chalk) to the underlying nonporous rock (clay), e.g., Claygate to the north of Leatherhead.
 - (d) i) Erosion of the soft chalk by the River Mole.
ii) A dry valley.
3. (a) The river meanders and there is riverine deposition on the inside of the meanders. The elevation is very low, the river is slow flowing, and there is evidence of a flood plain.
 - (b) The river is tidal as far upstream as Teddington.

The mouth of the Thames River is estuarine.

- (c) On the Town Plan the 25 foot contour line is indicated in red (both a dotted and continuous line). Although this contour line is difficult to follow it shows that the Thames has a wide flood plain.
4. (a) A 207 south west through Dartford.
A 118 north east to Brentwood.
A 5 north west (Watling Street).
A 315 west to Staines.

They all meet at London Bridge.

- (b) St. Paul's Cathedral lies northwest of Southwark Bridge and is almost surrounded by the 25 foot contour line.

These hilly outcrops of gravelly soil were important because, when the tide rose, the flood plain was inundated with water.

- (e) The river has been canalised by the building of retaining walls. These contained the water into a narrow channel which created deep water and permitted navigation by large ships. These walls also prevented inundation of the flood plain by floods and tides.

These retaining walls are called embankments, e.g., the Victoria Embankment.

- (f) Before the embankments were built there was extensive flooding of the north and south banks of the river up to the vicinity of the 25 foot contour line.

- 5. (a) Canon Street Railway Bridge, Southwark Bridge, and Blackfriars Bridge.

- (b) London Bridge.

- (c) A lift bridge (it opens in the middle).

Barges.

Wharves and cranes;
the Customs House;
Billingsgate Market.

- (d) By 4 tunnels and a ferry. This allows navigation of the river uninterrupted by bridges.

The underlying soft clay of the London Basin made tunnel construction easy.

- (e) The land enclosed by the meanders has been utilised for dock facilities. The low lying alluvial soil of the meanders was easily excavated for docks. Entrances and exits to the docks were easily excavated on either side of the meanders.

- (f) North of the River Thames at Stepney is the Limehouse Canal running north and west through Bethnal Green. South of the river is the Surrey Canal which runs south and west in the vicinity of

Deptford Park.

Heavy Industry.

6. (b) Bank of England.
Guildhall.
Royal Mint.
Royal Courts of Justice.
Inner Temple (law).
St. Paul's Cathedral.
General Post Office (G. P. O.)
- (c) There are at least 10 in an area of approximately 1 mile square.
The soft underlying clays made the construction of an underground railway system possible.
7. (a) Guildford.
Dorking.
Reigate-Redhill.
Sevenoaks.
- (b) Waterloo.
London Bridge Station.
- (c) Paddington.
St. Pancras.
Euston.
Victoria.
King's Cross.
Liverpool Street.
Charing Cross.

Note: Some of these railway stations have been closed down.

- (d) In both cities railway lines radiate out from the centre, passing through gaps in chalk hills. London has more main line termini than Paris, and they are linked together. In the case of both cities the major river valleys are not used by the railways.
8. (a) Houses of Parliament.
War Office.
Admiralty.
Buckingham Palace.
St. James' Palace.
New Scotland Yard.

Barracks.

- (b) Nelson's Column is located immediately north of Whitehall.
 - (c) Whitehall.
North to northwest.
 - (d) A: Whitehall.
B: The Mall.
C: Regent Street.
D: Charing Cross Road.
E: Trafalgar Square.
F: National Gallery.
G: Admiralty.
H: Admiralty Arch.
J: St. James' Park.
K: Church (St. Martin's in the Fields).
 - (e) London has expanded outward rather than upward (as in New York), because the very soft clays of the London Basin do not provide good foundations for skyscrapers.
9. (a) The Royal Observatory is located in the extreme southeast of the plan. The Prime Meridian passes through the Royal Observatory.
- (b) London's road pattern is focused on the bridges across the river, but apart from that shows little planning. Paris, however, exhibits a radial pattern in places, while most North American cities have a rectangular pattern.
 - (c) Approximately 10%.
 - (d) It would need a sheet of paper approximately 6 feet square.
10. (a) It is the geographic centre of the basin.
- It has excellent port facilities.
- It has excellent road, rail, river and air communications.
- (b) Government;
administration;
commerce and business, and banking;
port, warehousing, markets, trans-shipment;
heavy industry;

light industry;
transportation;
culture and religion;
education and entertainment;
residential, recreation and sport.

- (c) London has become the largest city because it performs more functions than the others. It is the natural port of entry for a much more populous and more industrially developed hinterland than Montreal or Paris.

PARIS

1. 6 Kilometres.
3½ miles (approx.)
2. 27 metres.
177 metres (near St. Leu-la-Forêt).
165 metres.
124 metres.
3. (a) ½ Kilometre.

(b) The 40 metre contour line passes through the Gare de l'Est which is 2½ kilometres from the river.

(c) On the north bank.

(d) An old meander channel of the river.
4. (a) 127 metres near Sacré Coeur.
128 metres east of the Gare de l'Est.

(b) The Sacré Coeur.

(c) Buttes are created by differential erosion and by river dissection.
5. (a) From Sèvres to Viroflay.
160 metres at Ville-d'Avray.
165 metres at Bois de Clamart.

(b) Road and rail transport.

(c) Forests which are available to the citizens of Paris for recreation.

(d) A ring of 9 forts can be seen guarding the approaches to Paris.
6. (a) Defensive position and bridging point.

(b) The Cathedral of Nôtre Dame. The Ile de la Cité is an ecclesiastical centre.
7. (a) The land to the north was very swampy as it was a former river bed. The advantages of the area south of the river are:

It avoided the swampy ground;

the bluff provided a site suitable for defence and control of the bridge;
the limestone provided excellent building stone.

- (b) The lower ground north of the river provided ease of construction of warehouses and commercial premises.
 - (c) Light industry, e.g. processing of food and clothing.
8. (a) Ships became larger and unable to pass under the bridges. There was more land available for building port facilities downstream.
- (b) On the inside of the meander near Gennevilliers.
 - (c) On the inside of the meander.
 - (d) The inside of the meander is flat, and composed of sedimentary material, making the construction of dock facilities easy. Entrance and exit from docks is easy on a meander.
 - (e) By canal through St. Denis to near the Gare d'Austerlitz. Note that this canal joins the Canal de l'Ourcq (not named), near to Porte de Villette.

The canals terminate near the Place de la Bastille.

A spur line connecting the railways from the north, east, and south, is to be seen near the Place de la Bastille.

- (f) 6 (3 to the north and 3 to the south).
- (g) Heavy Industry, e.g. metallurgical works.

The main sea port for entry of raw materials is Le Havre downstream from Paris, and the main coalfield lies to the northeast.

9. (a) The bridges spanning the river are low with numerous supports (abutments). Suspension or lift bridges are not necessary, since large vessels do not have to pass underneath.
- (b) Barges or pleasure craft.
 - (c) There is an absence of warehouses, cranes, and wharves. This has made possible the tree-lined boulevards (or quais) and side-walk cafés for which the banks of the Seine are famous.

- (d) The Pool of London is a centre of navigation for large vessels and is lined with warehouses, cranes, markets and wharves. The greater tidal range of London makes wharves necessary and also exposes vast areas of mud at low tide. By locating its heavy industry downstream Paris has avoided bringing air pollution into the heart of the city.

10. The sketch map should show the governmental area immediately south of the Ile de la Cité; the ecclesiastical area on the Ile de la Cité; business and commerce located immediately north of the river; light industry on the outskirts of the city, and heavy industry downstream.

11. (a) A: Gare St. Lazare. D: Gare d'Austerlitz.
B: Gare de l'Est. E: Gare Montparnasse.
C: Gare de Lyon.

The Gare du Nord is not shown on the photograph.

Rail routes radiate to west, northwest, north, east, south east, south and south west. For termini see Atlas.

- (b) Rail routes have sought the gaps through the highlands, e.g. between Montmorency and Montigny or between Meudan and Ville d'Avray. The rivers also focus on Paris.
- (c) The centre of Paris was already heavily built over by the time of the railway era. Thus the railways terminated some distance from the centre of the city, and each line had to have its own terminus.

12. (a) The plan devised by Haussman called for successive rings of boulevards connected by avenues radiating out from the Place de l'Etoile similar to the spokes of a wheel.

F: Place de la Bastille.

G: Place de la République.

- (b) Most North American cities have developed on the rectangular or grid system.
- (c) The old outer walls have been utilised as a ring road.
- (d) Place de l'Etoile – Arc de Triomphe.
Champs Elysée – The Elysée Palace (Home of the French President).
Sacré Coeur – on a limestone butte.

GA 151 B63 KEY
BLAIR CALVIN L
THE CANADIAN LANDSCAPE

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Blair, Calvin L.
The Canadian landscape;

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